

ACE Booster, Phase I

Completed Technology Project (2014 - 2014)



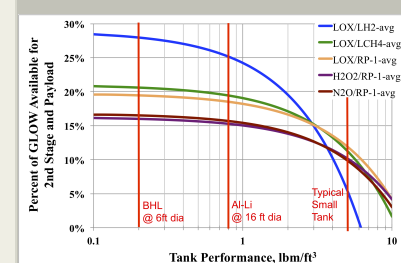
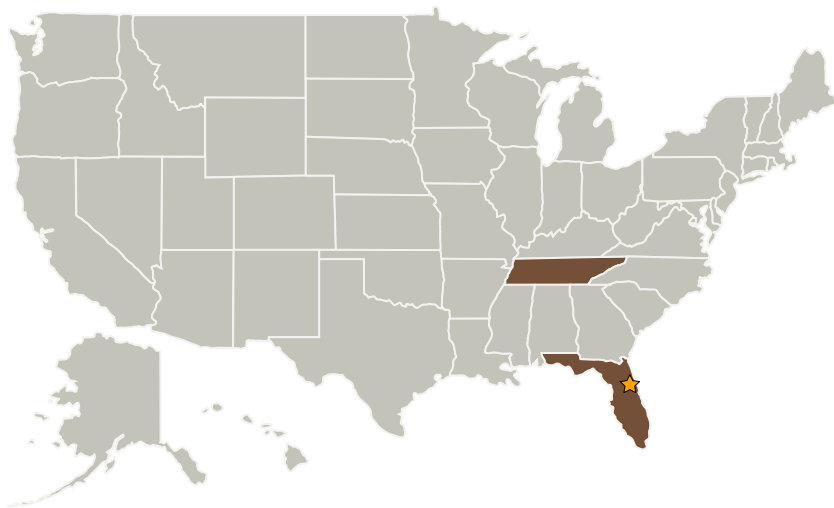
Project Introduction

GTL has been developing three transformational technologies that have the capability to disrupt the traditional launch vehicle paradigm. BHL composite cryotank technology provides a four times improvement over large Al-Li tanks, offering a 6 percentage point improvement in stage PMF. Superior Stability Engine is an innovative liquid rocket engine configured to maximize combustion stability margin while also maximizing engine performance. NORPS is a non-helium gas generator system that can be used to pressurize the propellant tanks for 1/3 the mass and 1/10 the volume of a comparable helium based system. The Advanced Cryogenic Expendable (ACE) Booster design uses these technologies to achieve high performance and low cost in a small vehicle. When implemented in an optimized design, the ACE technologies offer revolutionary performance. In the proposed Phase I effort, GTL will perform a conceptual design study to assess the impact of design constraints on the implementation of the ACE technologies. From this, an optimized design will be developed. A technology roadmap will be created to show how the capabilities can be achieved in the near term.

Anticipated Benefits

Potential NASA Commercial Applications: The ACE Booster offers the potential for substantial performance gains and cost savings that will aid NASA's access to space. When developed and implemented in a launch system, the ACE Booster would reduce the cost of launching small payloads to orbit. The technologies used in the ACE Booster could also be applied to larger vehicles, decreasing the overall cost to access space.

Primary U.S. Work Locations and Key Partners



ACE Booster Project Image

Table of Contents

Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	3
Technology Areas	3

ACE Booster, Phase I

Completed Technology Project (2014 - 2014)



Organizations Performing Work	Role	Type	Location
★ Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
Gloyer-Taylor Laboratories LLC	Supporting Organization	Industry	Tullahoma, Tennessee

Primary U.S. Work Locations

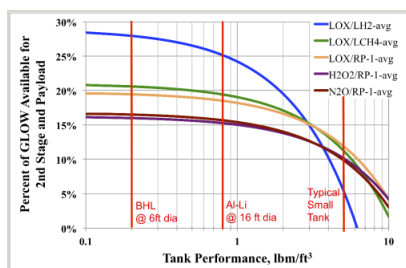
Florida	Tennessee
---------	-----------

Project Transitions

▶ **June 2014:** Project Start

✓ **December 2014:** Closed out

Images



Project Image

ACE Booster Project Image
(<https://techport.nasa.gov/image/4482>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

William W McQuade

Principal Investigator:

Paul Gloyer

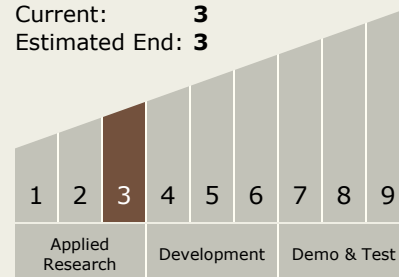
ACE Booster, Phase I

Completed Technology Project (2014 - 2014)



Technology Maturity (TRL)

Start: **3**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.1 Cryogenic Systems
 - └ TX14.1.2 Launch Vehicle Propellant